



Flight Opportunities



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Dear Flight Opportunities community,

We hope you're enjoying the summer season! Flight Opportunities is busy as ever with recent flights and upcoming campaigns, as well as proposal reviews underway for a variety of solicitations.

In this month's newsletter we're covering:

- A recap of **recent flights** made possible with funding administered by the Flight Opportunities program
- A **payload spotlight** featuring NASA Jet Propulsion Laboratory's Comet Sample Verification System
- A profile of flight provider **Masten Space Systems**, providing flights through the program since 2012
- Release of the **2016 Flight Opportunities Annual Report**
- Information about the **Materials International Space Station Experiment (MISSE) program**, a new member of the Flight Opportunities family of activities
- Information about **NASA's Cryogenic Fluid Management (CFM) RFI**—proposals are due August 11
- Upcoming **conferences and events** that you'll want to plan ahead for



Ronald Young, Program Manager

Thank you, as always, for being part of the Flight Opportunities community!

Ronald Young, *Program Manager*
NASA's Flight Opportunities Program

Flight Highlights

Recent Suborbital Flights Help Mature ADS-B Technologies and More

Several flights to test technology payloads took place in recent weeks:

- On May 19, 2017, **Near Space Corporation** flew its Small Balloon System (SBS) to test a technology from the Federal Aviation Administration (FAA) designed to advance automatic dependent surveillance broadcast (ADS-B) capabilities. **(T0159-B)**
- On June 23, 2017, Near Space flew its High Altitude Shuttle System (HASS) with GSSL, Inc., to test the feasibility of flying suborbital reusable launch vehicles (sRLVs) in the national airspace (NAS). **(T0106-B)**
- **World View** conducted a test of its new altitude control technology on June 29, 2017. The system will enable the capability to perform large altitude changes to achieve meaningful trajectory control of stratospheric balloon flights, in turn increasing the potential duration of flights. **(T0169-B)**

Payload Spotlight

JPL Technology Will Help Scientists Bring Comet Samples Back to Earth

Recent tests through NASA's Flight Opportunities program are helping validate the Comet Sample Verification System

Researchers at NASA's Jet Propulsion Laboratory (JPL) have developed a Comet Sample Verification System **(T0164)** that promises to advance scientists' ability to analyze the composition of comets.

"It's basically a tool that captures the comet surface sample so that NASA can bring it back to Earth for scientific analysis," explained Dr. Risaku Toda, principal investigator (PI) of the team leading the Comet Sample Verification System development. "But before the spacecraft comes back to Earth, we want to make sure that we have enough of the sample to conduct a wide variety of instrumental analyses—as well as to carefully divide the sample to send to collaborating institutions for their own scientific analyses."



The JPL research team poses with the Comet Sample Verification System payload following a successful test flight aboard ZERO-G's parabolic aircraft. From left to right: JPL researchers Jacob Tims, Dr. Valerie Scott, Vladimir Arutyunov, and PI Dr. Risaku Toda. NASA Photo/Josh Krohn.

Scientists are interested in studying comet surface samples for many reasons. Not only would their analysis help fill in gaps in the scientific community's understanding of how the solar system formed, but collecting comet surface samples is also a high priority identified by the [2013-2022 Decadal Survey](#).

JPL's revolutionary system uses fiberscope imaging to measure a sample before it returns to Earth. A bundle of nine fiberscopes observes a comet sample soon after acquisition. If the sample quantity is insufficient, reacquisition is attempted until a large enough sample is obtained.

The JPL team's technology was selected for flight testing as part of NASA's Space Technology Research, Development, Demonstration, and Infusion (REDDI) 2016 solicitation, administered through NASA's Flight Opportunities program. Recipients of SpaceTech-REDDI awards receive funds that allow them to purchase research flights from a suitable flight provider. In March 2017, Dr. Toda and his team flew the Comet Sample Verification System on a series of flights aboard [Zero Gravity Corporation's](#) (ZERO-G's) parabolic aircraft.

"For these flight tests, we were looking specifically at how the sample will be measured to see if we could validate the accuracy in a microgravity environment," said Dr. Toda.

The PI and his team tested 12 sample canisters over the course of two flights consisting of a total of 60 parabolas, validating a technology readiness level (TRL) 6 and confirming their next steps. Dr. Toda said the flights were a critical component of helping the research team accumulate the data they need for their next phase of proposed research, including steps that will put it in consideration for infusion into NASA imaging applications for deep-space missions or other harsh environments.

Flight Provider Profile

Masten Space Systems

Long-duration stratospheric research missions could allow scientists to collect vast amounts of continuous data. As one of Flight Opportunities' first commercial flight providers, **Masten Space Systems** (Mojave, CA) is currently focused on flight testing entry, descent, and landing (EDL) technologies that help ensure precise and safe landings on future missions to the moon and potentially other planetary bodies. Masten is also a partner in NASA's Lunar Cargo Transportation and Landing by Soft Touchdown (Lunar CATALYST) initiative, which assists in the development of commercial capabilities to deliver payloads to the moon.

For Flight Opportunities, Masten's Xombie vehicle has been used for seven flight campaigns, notably:

- Successful testing of **Astrobotic Technology's lunar landing system**, garnering the company its third Milestone Prize in the Google Lunar XPRIZE competition
- Critical testing to prepare **Carnegie Mellon University's flyover mapping and modeling technology** for a potential future lunar mission
- Successful demonstration of NASA's Jet Propulsion Laboratory's (JPL's) **Lander Vision System** was flown as a component of a larger system of experimental landing technologies called the **Autonomous Descent and Ascent Powered-flight Testbed (ADAPT)**.

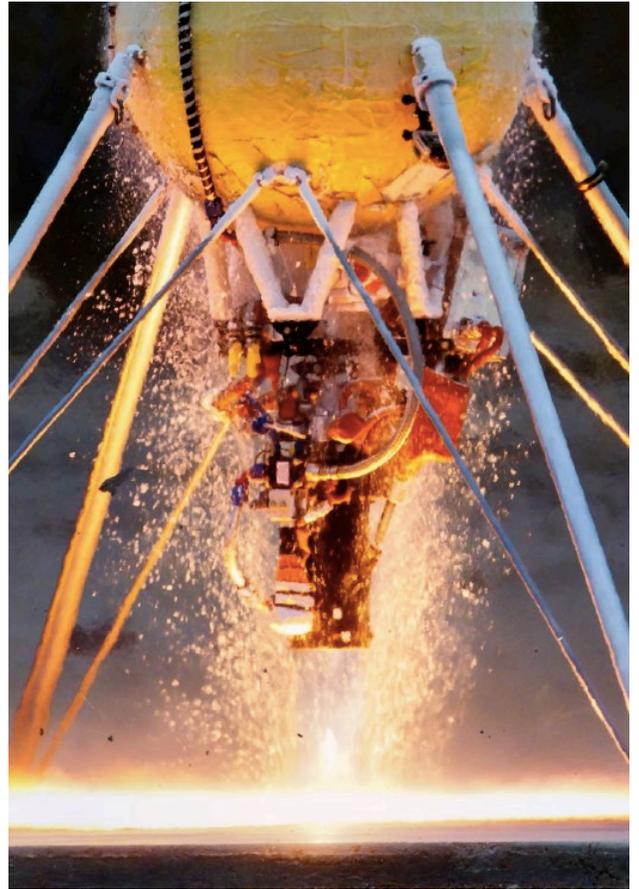
The company was also awarded a Tipping Point grant in 2016 for the development of a 3-D printed engine.

Available Flight Platforms

Now entering retirement, the Xombie vehicle is being replaced by Masten's Xaero and Xodiac vertical takeoff, vertical landing (VTVL) platforms:

- Xodiac
 - Primarily used for terrestrial demonstrations
 - Designed for lunar and Martian landing technologies
- Xaero
 - Focused on cradle landing technology

For more information about Masten Space Systems, visit: www.masten.aero



*Masten's Xodiac main engine start and liftoff.
Photo credit: Masten Space Systems*

Materials International Space Station Experiment

NASA materials science and technology research experiments can be conducted aboard the ISS through calls from the Materials International Space Station Experiment (MISSE) program. Since 2001, the MISSE series has tested some 4,000 materials samples and specimens--from lubricants and paints to fabrics, container seals, and solar cell technologies--to investigate the effects of long-term exposure of materials to the harsh space environment.

The MISSE calls seek high-content experiments that explore a broad range of questions as well as those that address specific material properties and gather significant amounts of data. These data are made available to the global community of researchers through the **NASA Physical Sciences Informatics (PSI)** system and the **NASA Materials and Processes Technical Information System (MAPTIS)**.



NASA astronaut Andrew Feustel working to install a new Materials International Space Station Experiment (MISSE-8). NASA image.

Flight Opportunities now leads NASA's efforts to identify samples and experiments across different NASA sponsoring organizations that are suitable for the MISSE program. Selections from the spring 2017 call are expected in the coming weeks, and the next call is expected to open in December 2017. Please don't hesitate to **contact us** if you have questions about this opportunity.

NASA RFI Submissions for Cryogenic Fluid Management Technologies Due August 11

NASA's Space Technology Mission Directorate (STMD) released a Request for Information (RFI), titled "Cryogenic Fluid Management (CFM) Technology Development," on July 12, 2017. RFI responses must be submitted through NSPIRES by August 11 at 5 p.m. EDT. To learn more and to submit a response:

1. Open the NSPIRES homepage at <http://nspires.nasaprs.com/>
2. Select "Solicitations"
3. Select "Open Solicitations"
4. Select "NNH17ZOA001L"

Upcoming Conferences & Events

Don't forget to check out these upcoming events...

- Aug. 5-10: **Small Satellite Conference 2017**
- Sep. 12-14: **American Institute of Aeronautics and Astronautics (AIAA) Space 2017**
- Oct. 11-12: **International Symposium For Personal And Commercial Spaceflight (ISPCS) 2017**
- Oct. 25-28: **American Society for Gravitational and Space Research (ASGSR) Conference 2017**
- Dec. 5-7: **SpaceCom 2017**
- Dec. 11-15: **AGU Fall Meeting 2017**
- Dec. 18-20: **Next-Generation Suborbital Researchers Conference (NSRC)**



Have ideas or feedback for the Flight Opportunities newsletter?
Drop us a line at: NASA-FlightOpportunities@mail.nasa.gov

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NASA Flight Opportunities Program

650-604-5876 (Stephen Ord - Technology Manager) | www.nasa.gov/flightopportunities

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